DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 12 August 2011 have been fully considered but they are not persuasive.

Regarding page 10, lines 1-4: All of the rejections presented in the office action mailed 15 April 2011 are maintained for the reasons discussed below in response to Applicant's arguments. Therefore, **the present action is made final.**

Regarding page 10, lines 6-17: In selectively quoting MPEP § 706.02(I), Applicant has conveniently omitted the three different instances in which multiple rejections are allowed. The three instances explicitly stated in MPEP § 706.02(I) are: (A) the propriety of a 35 U.S.C. 102 or 103 depends on a particular interpretation of the claims, (B) a claim is met only in terms by a reference which does not disclose the inventive concept involved, or (C) the most pertinent reference seems likely to be antedated by a 37 C.F.R. 1.131 affidavit or declaration.

Option (A) is the most applicable to the present application. Throughout the prosecution of the present application, as well as other co-pending applications, Applicant has insisted that the claim language as recited requires, for example, that all four steps of claim 1 must be taught by a single reference in order to be properly rejected under 35 U.S.C. 102. Such has been insisted despite the fact that the recited language clearly states "at least one of" the four steps comprise the recited method, and thus not all of the steps are required in the recited method.

Furthermore, Examiner is entrusted with a duty to give Applicant a full and fair hearing, and develop a clear issue between Applicant and Examiner, before making an office action final (See, e.g., MPEP § 706.07). One purpose of the second set of rejections is to fully demonstrate to Applicant that none of the presently pending claims are patentable. In addition, on page 26 of the previous office action, Examiner cited four other reference which are relevant to the present set of claims, and has thus refrained from applying "merely cumulative rejections" to the present application. Simply having a "backup" set of rejections is not generally considered applying "merely cumulative rejections" to an application, but is often used when an examiner is presented with claim language of unusual recitation, such as is the case with the present application.

The simple facts are that (1) none of the presently recited claims are allowable over the prior art, (2) none of the presently recited claims are enabled by Applicant's disclosure, and (3) none of the presently recited claims are clearly defined, all three of which are statutory requirements for patentability.

Finally, Examiner included the additional set of rejections as a favor to Applicant. Rather than tying up valuable time and other resources in the Appeal process, such as is now the case with co-pending applications 10/559,442, 10/560,477, and 10/560,499, Examiner had hoped to convince Applicant to pursue a more effective line of prosecution of the present application.

All of the claims are rejected over the prior art. Thus, amendments would need to be made that incorporate additional features of Applicant's disclosure that overcome the presently applied prior art. Furthermore, amendments would be needed so that the claims fully comply with the requirements of 35 U.S.C. § 112, first and second paragraphs. However, if Applicant

does not wish to pursue the line of prosecution set forth above, Applicant can, for example, either abandon the application or file yet another Appeal Brief, thus rendering Examiner's efforts to aid Applicant fruitless.

Regarding page 10, line 19 to page 11, line 23: Applicant is correct in stating that all the questions posed on page 9 of the previous office action ultimately stem from the first question posed by Examiner on page 9. However, Applicant's response does not answer Examiner's question since Applicant does not explain how one of ordinary skill in the art would select which of the four recited steps to use. Applicant merely makes the bare assertion that one of ordinary skill in the art at the time of the invention would have known how to make such a selection, and therefore make and/or use the recited invention. Even though the specification states explicitly the four technical categories can be jointly applied, such a statement is merely a bare assertion. Not the least substantive detail is given apart from that bare assertion in Applicant's disclosure.

Further, Applicant's quotation of page 11, lines 27-31 of the specification merely relates to the fourth recited step of claim 1, and does not in any way demonstrate how the four recited steps may be jointly applied. Therefore, Applicant has ultimately failed to demonstrate how the joint application of the four recited steps in claim 1 are enabled by Applicant's disclosure. Accordingly, the rejections under 35 U.S.C. 112, 1st paragraph are maintained.

Regarding page 11, line 25 to page 12, line 4: As stated above, Applicant's quotation of the early stopping threshold corresponds only to the fourth recited step, and not to the alleged

joint application of the four recited steps. Further, Applicant's response has not addressed the rejections as presented. By reciting "at least one of" the steps are to be performed, the claim language allows for two or more of the recited steps to be performed. Such a condition leads to the contradictory nature of the claim language, as expounded on page 10 of the office action mailed 15 April 2011. Each of the four steps is sufficient in and of itself to select the macroblock mode. Thus, if two or more steps are applied, which macroblock mode is the correct macroblock mode? Applicant has not answered this question.

Due to the ambiguous nature of the claim language, the rejections under 35 U.S.C. 112, 2nd paragraph are maintained.

Regarding page 12, line 6 to page 13, lines 26: Kondo (US-2004/0218674) fully teaches the first recited step of claim 1, and therefore fully anticipates claim 1 owing to the "at least one of" clause in the preamble. Applicant's arguments regarding the lack of shortcuts do not address the claim limitations as specifically recited. While such may be the purpose of the invention, Examiner is required to examine the claim language as specifically recited using the broadest reasonable interpretation consistent with the specification (See MPEP § 2111), without incorporating limitations from the specification (See MPEP § 2111.01(II)).

With respect to claim 1, and the similarly recited language in claims 13 and 25, paragraph 49 of Kondo, among other portions of Kondo, specifically states that mode selection is performed with respect to macroblocks, not entire frames. This is further borne out, for example, in figure 5 of Kondo in which the mode of a particular macroblock of a frame is determined based on the macroblock modes of particular macroblocks within two other frames. For coding

the particular macroblock, a variety of different possible macroblock coding operations can be performed, as set forth in paragraph 49 of Kondo. Paragraph 46 of Kondo describes that every macroblock is individually coded. Before the selection of the coding mode, the available possible coding modes are narrowed down based on the macroblock modes and motion vectors present in the macroblocks of other selected frames.

Therefore, the possible macroblock modes are reduced to a subset of modes based on the macroblock modes and motion vectors of other frames, and a second selection is performed from the available modes based on the particular data obtained in order to determine which particular mode will be used to code the macroblock under consideration. Thus, Kondo fully teaches the first recited step of the method, and therefore fully anticipates claim 1, as well as claims 13 and 25 due to similar reasoning.

Regarding page 13, line 28 to page 14, line 17: Kondo fully teaches the second step recited in the method of claim 1, as well as the similar language recited in claims 13 and 25. Applicant appears to have misunderstood Examiner's position with respect to the second step. Motion vectors are computed in the determination of macroblock modes. Paragraphs 60-61 of Kondo explain how the computed motion vectors are stored after the mode of a particular macroblock in a particular frame is determined. The mode of the determined neighboring macroblock mode, which is based on the determined motion vector for the corresponding macroblock, is used to determine the mode of the current macroblock, as discussed in paragraphs 53-54 and paragraph 57, lines 1-4 of Kondo. Therefore, Kondo fully teaches the second recited

step of the method, and thus for a second and separate reason fully anticipates claim 1, as well as claims 13 and 25 due to similar reasoning.

Regarding page 14, line 19 to page 15, line 12: Kondo fully teaches the third step recited in the method claim 1, as well as the similar language recited in claims 13 and 25. Paragraph 60 of Kondo specifically states "In the above examples, all of the blocks B~D have motion vectors, but if these blocks are coded as intra blocks or in direct mode, exceptional processing may be performed for them. For example, if one of the blocks B~D is a block of such a type, the motion vectors for that block are considered to be 0 for coding. If two of them are blocks of such a type, the motion vectors of the remaining block are used as predicted vectors. And if all of the blocks have no motion vector, motion vectors are coded on the assumption that the predicted vector is 0. This type of processing may also be applied."

Thus, not only is the processing cost determined ("exceptional processing may be performed for them" and "motion vectors are coded on the assumption that the predicted vector is 0"), the processing cost (i.e., if "exceptional processing" is required) is used to determine if only intra-coded modes are to be checked and selected, as required by the specifically recited claim language. Therefore, Kondo fully teaches the third recited step of the method, and thus for a third and separate reason fully anticipates claim 1, as well as claims 13 and 25 due to similar reasoning.

Regarding page 15, line 14 to page 16, line 6: Kondo fully teaches the fourth step recited in the method claim 1, as well as the similar language recited in claims 13 and 25. In

paragraph 60 of Kondo, as cited in the previous office action, if a macroblock is an intra-coded macroblock, the motion vector is assumed to be zero. It is not calculated to be zero and the mode thus correspondingly determined based on the motion vector. Rather, if the conditions are met such that the motion vector is assumed to be zero, the determination of the mode is stopped early and assumed based on the available data, which includes the threshold of a zero motion vector. Thus, if all three of the macroblocks discussed therein are intra-coded or in direct mode, zero motion vector and intra-coding assumed. If two macroblocks are intra-coded or in direct mode, inter-coding is used and the motion vector assumed to be equal to the motion vector of the remaining macroblock.

Thus, the early stopping threshold stops the checking of the macroblock modes if all three motion vectors are zero. Intra-coding is assumed and further mode checking is stopped at that point. However, if such is not the case, the early stopping threshold is adjusted so that, if two macroblocks are intra-coded or in direct mode, inter-coding is used and the motion vector assumed to be equal to the motion vector of the remaining macroblock. Further mode checking is stopped at that point. Therefore, Kondo fully teaches the fourth recited step of the method, and thus for a fourth and separate reason fully anticipates claim 1, as well as claims 13 and 25 due to similar reasoning.

Examiner further notes at this point, purely for the sake of argument, that even if Kondo were found to not teach one, two or even three of the steps recited in claim 1, but only teaches one of the recited steps of the method of claim 1, Kondo still fully anticipates claim 1

due to the "at least one of" language recited in the preamble. Kondo would also fully anticipate claims 13 and 25 for similar reasons.

Regarding page 16, lines 8-23: Kondo fully teaches the disputed limitations of claim 37. For example, figures 3a-3d and paragraph 55 of Kondo demonstrate how the motion vector is to be calculated based on various combinations of motion vectors. In Kondo, the motion vectors are determined based on the macroblock mode to be encoded. Further, in paragraph 60 of Kondo, motion vectors and macroblock modes are determined based on assumptions regarding the relationships between motion vectors and whether the surrounding macroblocks are intra-coded or inter-coded. Paragraphs 60 and 63 of Kondo discuss comparing the modes so as to code in the most efficient manner based on the assumptions regarding motion vectors and coding modes. Depending on the determined relations, the most efficient mode is applied and the predicted vector is determined according to the applied assumptions. For example, "exceptional processing" is used in the case of intra-coded macroblocks, but in a case where the motion vectors of particular neighboring macroblocks are zero, the motion vector of the current macroblock is also assumed to be zero and the macroblock mode selected accordingly. Thus, Kondo fully teaches the disputed limitations of claim 37.

Regarding page 16, line 25 to page 17, line 27: Examiner has shown in the above rebuttal and the repeated rejections set forth below that claims 1, 13, 25 and 37 are not patentable and are fully taught by Kondo. Therefore, the remaining dependent claims are not patentable

merely due to their respective dependencies. Additionally, the other cited references need not be considered with respect to claims 1, 13, 25 and 37.

Regarding page 17, line 29 to page 18, line 14: As discussed in detail above, the second set of prior art rejections are not "merely cumulative" in the sense set forth in the MPEP. Further, Applicant's arguments regarding the use of "shortcuts" does not address the specifically recited language of the claims.

Regarding page 18, line 16 to page 19, line 2: Wiegand ("Rate Distortion Optimized Mode Selection for Very Low Bit Rate Video Coding and the Emerging H.263 Standard," by Thomas Wiegand, Michael Lightstone, Debargha Mukherjee, T. George Campbell, and Sanjit K. Mitra, IEEE Transactions on Circuits and Systems for Video Technology, April 1996, pages 182-190) fully teaches the first recited step of claim 1, and therefore fully anticipates claim 1 owing to the "at least one of" clause in the preamble. Page 184, left column, lines 6-34 (as cited on page 19 in the previous office action of 15 April 2011) discuss how the modes are selected by first checking the macroblock modes and limiting the macroblock mode so that it is only impacted by a particular subset of macroblock modes, namely the modes with particular rate and distortion ranges as specified by the particular codec being applied. Thus, Wiegand fully teaches the first recited step of the method, and therefore fully anticipates claim 1, as well as claims 13 and 25 due to similar reasoning.

Regarding page 19, lines 4-18: Applicant merely argues that Wiegand does not have support in the reference, but does not address the specific citations set forth in the previous office action. Examiner cited page 184, left column, lines 6-34 of Wiegand, along with an explanatory note in the parenthetical. Specifically, Examiner demonstrated that the macroblock modes are not only checked in the manner discussed above, but the macroblock modes used in the selection are also based on the modes of adjacent macroblocks. Therefore, Wiegand fully teaches the second recited step of the method, and thus for a second and separate reason fully anticipates claim 1, as well as claims 13 and 25 due to similar reasoning.

Regarding page 19, line 20 to page 20, line 7: Again, Applicant does not attempt to rebut the specific citations set forth by Examiner in the previous office action. In the appropriate section of page 19 of the previous office action, Examiner cites page 183, right column, lines 2-7; and page 184, left column, lines 6-21 of Wiegand. Therein, Wiegand states, for example "coding a particular macroblock directly (intraframe coding) may be more productive in situations when the block-based translational motion model breaks down. For relatively dormant regions of the video, simply copying a portion of the previously decoded from into the current frame may be preferred." In other words, it is determined whether the more costly procedure of direct coding should be performed, or if simple copying should be performed, based on the particular characteristics of the macroblocks. If a certain threshold is surpassed, which would be an inherent part of determining if the region of the video is "relatively dormant," only the intra-coded are checked and used in determining which mode is to be selected for coding the macroblock. Therefore, Wiegand fully teaches the third recited step of the method, and thus for

a third and separate reason fully anticipates claim 1, as well as claims 13 and 25 due to similar reasoning.

Regarding page 20, lines 9-25: Wiegand teaches, in Sections B and C found on pages 184-185, adjusting the limiting condition based on the determined Langrangian multiplier, thus optimizing the mode switching. The limiting condition discussed in Wiegand determines the conditions upon which the mode switching is optimized, and thus corresponds to the recited "early-stopping threshold." Thus, based on the calculated Langrangian multiplier, the mode selection is limited to a certain group which is then checked to determine which mode optimizes the parameters of mode switching. Therefore, Wiegand fully teaches the fourth recited step of the method, and thus for a fourth and separate reason fully anticipates claim 1, as well as claims 13 and 25 due to similar reasoning.

Regarding page 20, line 27 to page 21, line 8: As discussed above, Wiegand checks a subset of modes rather than all of the modes. Wiegand first determines the Langrangian multipliers. Based on the Lagrangian multipliers, the parameters related to mode switching are optimized so that the optimal modes can be checked to determine which mode should be used for coding the current macroblock.

Regarding page 21, line 10 to page 22, line 13: Examiner has shown in the above rebuttal and the repeated rejections set forth below that claims 1, 13, 25 and 37 are not patentable and are fully taught by Wiegand. Therefore, the remaining dependent claims are not patentable

merely due to their respective dependencies. Additionally, the other cited references need not be considered with respect to claims 1, 13, 25 and 37.

BASES OF REJECTIONS

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. Claims 1-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 1 recites a video encoding method comprising "at least one of:" a series of four macroblock mode selection steps. The language thus allows that two or more of the steps may occur during the execution of the method. However, the specification teaches each of the four steps separately and each step is sufficient in and of itself to perform the macroblock mode selection. Further, the specification only makes the bare mention that the steps can be applied jointly (page 9, lines 26-27 of Applicant's Specification).

There are no disclosed details which would enable one of ordinary skill in the art at the time of the invention to apply the steps jointly, nor would it have been apparent how such joint application could occur. For example, what criteria would one use to determine which of the four steps are to be applied for selecting the macroblock mode? Under which conditions would

the method check first modes for a subset of macroblock modes? Under which conditions would the method check the macroblock mode of at least one neighboring macroblock? Under which conditions would the cost of a subset of macroblock modes be checked? Under which conditions would early-stopping threshold be adjusted and the current macroblock mode be selected in response to the checked macroblock modes? Applicant's disclosure does not explain this and it is not apparent how the four steps would be used jointly.

Apart from the mere mention of joint application of the four steps, the four steps are shown to operate independently of each other and fully select the mode for the current macroblock. Thus, claim 1 is not enabled by Applicant's disclosure.

Claims 2-12 each ultimately depend from claim 1, and thus incorporate all of the features of claim 1. Therefore, claims 2-12 are also not enabled by Applicant's disclosure.

Claim 13 recites a video encoder comprising "at least one of" four different "means" which correspond to the above mentioned four macroblock mode selection steps. Similarly, beyond the bare mention of joint application, Applicant's disclosure merely shows four independently operating means. Thus, for the reasons set forth above with respect to claim 1, claim 13 is not enabled by Applicant's disclosure.

Claims 14-24 each ultimately depend from claim 13, and thus incorporate all of the features of claim 13. Therefore, claims 14-24 are also not enabled by Applicant's disclosure.

Claim 25 recites a computer-readable non-transitory medium for performing the method of claim 1. Thus, claim 25 is not enabled by Applicant's disclosure for the reasons set forth above with respect to claim 1.

Claims 26-36 each ultimately depend from claim 25, and thus incorporate all of the features of claim 25. Therefore, claims 26-36 are also not enabled by Applicant's disclosure.

4. Claims 1-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites a video encoding method comprising "at least one of:" a series of four macroblock mode selection steps. The language thus allows that two or more of the steps may occur during the execution of the method. However, each step is sufficient in and of itself to select the macroblock mode. For example, if the first step is performed, the result is that the current macroblock mode is selected. If the second step were then to be performed, there would be a conflict as to which "current macroblock" is the real current macroblock. Such an ambiguity would occur for any combination of steps in which two or more of the four recited macroblock mode selection steps are performed. Thus, Applicant fails to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 2-12 each ultimately depend from claim 1, and thus incorporate all of the features of claim 1. Therefore, claims 2-12 are also indefinite.

Claim 13 recites a video encoder comprising "at least one of" four different "means" which correspond to the above mentioned four macroblock mode selection steps. Thus, claim 13 is indefinite for the reasons set forth for claim 1.

Claims 14-26 each ultimately depend from claim 13, and thus incorporate all of the features of claim 13. Therefore, claims 14-26 are also indefinite. Further, claim 14 recites a

"first-checking means" which performs the same recited function as the "first means" of claim 13. Are these meant to be separate means, or the same means? If separate means, how do they separately perform the same function? If same means, they should both be called either "first means" or "first-checking means". Similarly, claim 16 recites "neighbor-checking means" which performs the same function as the "macroblock means" of claim 13; claim 17 recites "intra-checking means" which performs the same function as the "subset means" of claim 13; and claim 18 recites "thresholding means" which performs the same function as the "stopping means" of claim 13. Therefore Applicant, for these additional reasons, has failed to particularly point out and distinctly claim the subject matter Applicant regards as the invention in claims 14, 16, 17 and 18.

Claim 25 recites a computer-readable non-transitory medium for performing the method of claim 1. Thus, claim 25 is indefinite for the reasons set forth for claim 1.

Claims 26-36 each ultimately depend from claim 25, and thus incorporate all of the features of claim 25. Therefore, claims 26-36 are also indefinite.

FIRST SET OF PRIOR ART REJECTIONS

5. Claims 1, 2, 4-6, 9-14, 16-18, 21-26, 28-30 and 33-37 are rejected under 35 U.S.C. 102(e) as being anticipated by Kondo (US-2004/0218674).

Regarding claims 1, 13 and 25: Kondo discloses in a video encoder having a processor, a video encoding method for encoding a current macroblock of an inter-coded frame (**fig. 1 and para. 49, lines 1-11 of Kondo**), the method comprising at least one of:

checking first modes for a subset of macroblock modes **(para. 46-47 of Kondo)**, selectively checking other modes in response to motion vector information of the checked first modes **(para. 48 of Kondo)**, and selecting the mode for the current macroblock in response to the checked modes **(para. 49, lines 1-11 of Kondo)**;

checking the macroblock mode of at least one neighboring macroblock **(paras. 53-54 and para. 57, lines 1-4 of Kondo)**, and selecting the mode for the current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock **(paras. 60-61 of Kondo)**;

checking the cost of a subset of macroblock modes **(para. 60 of Kondo** - *processing cost determined based on characteristics of neighboring macroblocks***)**, further checking only intra-coded modes if the checked cost meets a preset criteria **(para. 60, lines 8-11 of Kondo)**, and selecting the mode for the current macroblock in response to the checked modes **(para. 63, lines 1-6 of Kondo)**; and

adjusting an early-stopping threshold in response to checked macroblock modes, and selecting the mode for the current macroblock in response to the checked macroblock modes if the adjusted early-stopping threshold is met **(para. 60 of Kondo** – *if macroblock is intra-coded macroblock, motion vector is assumed to be zero; if all three are intra-coded or in direct mode, zero motion vector and intra-coding assumed; if two are intra-coded or in direct mode, inter-coding is used and motion vector assumed to be equal to motion vector of remaining macroblock*),

wherein the method further comprises encoding the current macroblock using the selected mode for the current macroblock **(para. 50 of Kondo)**.

Further regarding claim 13: The method of claim 1 is implemented by a video encoder **(fig. 1 of Kondo)**.

Further regarding claim 25: The method of claim 1 is implemented *via* a computer-readable non-transitory medium **(para. 126, lines 14-17 of Kondo)**.

Regarding claims 2, 14 and 26: Kondo discloses checking first modes for a subset of macroblock modes **(para. 46-47 of Kondo)**, selectively checking other modes in response to motion vector information of the checked first modes **(para. 48 of Kondo)**, and selecting the mode for the current macroblock in response to the checked modes **(para. 49, lines 1-11 of Kondo)**.

Regarding claims 4, 16 and 28: Kondo discloses checking the macroblock mode of at least one neighboring macroblock **(paras. 53-54 and para. 57, lines 1-4 of Kondo)**, and selecting the mode for the current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock **(paras. 60-61 of Kondo)**.

Regarding claims 5, 17 and 29: Kondo discloses checking the cost of a subset of macroblock modes **(para. 60 of Kondo** - *processing cost determined based on characteristics of neighboring macroblocks*), further checking only intra-coded modes if the checked cost meets a preset criteria **(para. 60, lines 8-11 of Kondo)**, and selecting the mode for the current macroblock in response to the checked modes **(para. 63, lines 1-6 of Kondo)**.

Regarding claims 6, 18 and 30: Kondo discloses adjusting an early-stopping threshold in response to checked macroblock modes, and selecting the mode for the current macroblock in response to the checked macroblock modes if the adjusted early-stopping threshold is met **(para. 60 of Kondo** – *if macroblock is intra-coded macroblock, motion vector is assumed to be zero; if*

all three are intra-coded or in direct mode, zero motion vector and intra-coding assumed; if two are intra-coded or in direct mode, inter-coding is used and motion vector assumed to be equal to motion vector of remaining macroblock).

Regarding claims 9, 21 and 33: Kondo discloses wherein spatial/temporal neighboring macroblock and block partition information is used to decide the subset of possible block sizes or inter/intra modes that need to be checked **(figs. 3a-3d and para. 60 of Kondo)**.

Regarding claims 10, 22 and 34: Kondo discloses initially performing mode checking for a subset of both inter modes and intra modes **(para. 60 of Kondo)**;

calculating a complexity measure responsive to the mode checking **(para. 60, lines 4-11 of Kondo)**; and

using the complexity measure to determine if other inter modes and intra modes should be performed **(para. 63 of Kondo)**.

Regarding claims 11, 23 and 35: Kondo discloses wherein the early stop criteria are based on adaptive thresholding to stop checking other inter or intra modes **(para. 60, lines 4-11 of Kondo** – *motion vectors for mode determination are computed based on whether the neighbor macroblock should be checked*).

Regarding claims 12, 24 and 36: Kondo discloses wherein early termination takes place if spatially or/and temporally neighboring macroblocks have a specific relationship with the motion information of the current macroblock after examining a specific mode **(para. 60, lines 4-11 of Kondo** – *if intra-coded macroblock, motion vector is assumed to be zero and no further examination is performed*).

Regarding claim 37: Kondo discloses in a video encoder having a processor, a video encoding method for encoding a macroblock of an inter-coded frame **(fig. 1 and para. 49, lines 1-11 of Kondo)**, the method comprising:

selecting a subset of macroblock modes for encoding **(figs. 3a-3d and para. 55 of Kondo)**;

comparing said subset of macroblock modes for coding efficiency **(paras. 60 and 63 of Kondo** – *inter/intra coding and motion vectors to be computed are determined using the macroblock modes of neighboring macroblocks based on assumptions regarding the motion vectors*);

selecting a mode having favorable coding efficiency, responsive to said step of comparing modes **(para. 57, lines 1-4; para. 58, lines 1-4; para. 59, lines 1-5; and para. 64 of Kondo)**; and

encoding the macroblock using the selected mode **(para. 50 of Kondo)**.

6. Claims 3, 15 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo (US-2004/0218674) in view of Wang (US-2003/0099292).

Regarding claims 3, 15 and 27: Kondo does not disclose expressly wherein said first modes comprise the quadratic modes of SKIP, 16x16, 8x8, and 4x4.

Wang discloses wherein said first modes comprise the quadratic modes of SKIP (para. 97 of Wang), 16x16, 8x8, and 4x4 (figs. 3a-3f and para. 57-58 of Wang).

Kondo and Wang are combinable because they are from the same field of endeavor, namely digital video data encoding. At the time of the invention, it would have been obvious to

a person of ordinary skill in the art to use the quadratic modes of SKIP, 16x16, 8x8, and 4x4, as taught by Wang. The suggestion for doing so would have been that the modes are commonly used modes for macroblock encoding. Therefore, it would have been obvious to combine Wang with Kondo to obtain the invention as specified in claims 3, 15 and 27.

7. Claims 7, 8, 19, 20, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo (US-2004/0218674) in view of Kim (US-5,926,573).

Regarding claims 7, 19 and 31: Kondo does not disclose expressly initially performing motion estimation only for a subset of the possible block sizes; and using the motion information to determine if other motion estimation or complexity measures should be performed for other block sizes.

Kim discloses initially performing motion estimation **(column 4, lines 63-67 of Kim)** only for a subset of the possible block sizes; and using the motion information to determine if other motion estimation or complexity measures should be performed for other block sizes **(fig. 2 and column 3, lines 37-46 of Kim** – *The original macroblock modes are checked first to determine if the mode is appropriate for recoding. If not, then and only then are additional macroblock modes checked. Intra versus inter coding uses different sizes, as do the different inter-coding macroblock modes.*).

Kondo and Kim are analogous art because they are from the same field of endeavor, namely digital video data encoding. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initially perform motion estimation only for a subset of the possible block sizes, and use the motion information to determine if other motion estimation or

complexity measures should be performed for other block sizes, as taught by Kim. The motivation for doing so would have been to improve the overall encoding efficiency. Therefore, it would have been obvious to combine Kim with Kondo to obtain the invention as specified in claims 7, 19 and 31.

Regarding claims 8, 20 and 32: Kondo does not disclose expressly wherein said first modes are checked first and their motion information is used to decide if other modes needs to be checked.

Kim discloses wherein said first modes are checked first and their motion information is used to decide if other modes needs to be checked **(fig. 2 and column 3, lines 37-46 of Kim)**.

Kondo and Kim are analogous art because they are from the same field of endeavor, namely digital video data encoding. At the time of the invention, it would have been obvious to check said first modes first and use their motion information to decide if other modes need to be checked, as taught by Kim. The motivation for doing so would have been to improve the overall encoding efficiency. Therefore, it would have been obvious to combine Kim with Kondo to obtain the invention as specified in claims 8, 20 and 32.

SECOND SET OF PRIOR ART REJECTIONS

8. Claims 1, 2, 4-6, 9-14, 16-18, 21-26, 28-30 and 33-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Wiegand ("Rate Distortion Optimized Mode Selection for Very Low Bit Rate Video Coding and the Emerging H.263 Standard," by Thomas Wiegand, Michael Lightstone, Debargha Mukherjee, T. George Campbell, and

Sanjit K. Mitra, IEEE Transactions on Circuits and Systems for Video Technology, April 1996, pages 182-190).

Regarding claims 1, 13 and 25: Wiegand discloses a video encoder having a processor **(page 182, left column, lines 1-2 after "Introduction" of Wiegand)** for encoding a current macroblock of an inter-coded frame **(page 182, right column, lines 13-15 of Wiegand)**, the encoder comprising the processor **(page 183, left column, lines 3-6 of Wiegand** – *some form of processor required to process digital video data*) and at least one of:

first means for checking the first modes for a subset of macroblock modes, selectively checking other modes in response to motion vector information of the checked first modes, and selecting the mode for the current macroblock in response to the checked modes **(page 184, left column, lines 6-34 of Wiegand [line 6 to fifteen lines past equation 6]** – *macroblock modes used in the selection are limited based on distortion and motion vector information*);

macroblock means for checking the macroblock mode of at least one neighboring macroblock, and selecting the mode for the current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock **(page 184, left column, lines 6-34 of Wiegand [line 6 to fifteen lines past equation 6]** – *macroblock modes used in the selection are limited not only based on the current mode, but also on the modes of adjacent macroblocks*);

subset means for checking the cost of a subset of macroblock modes, further checking only intra-coded modes if the checked cost meets a preset criteria, and selecting the mode for the current macroblock in response to the checked modes **(page 183, right column, lines 2-7; and page 184, left column, lines 6-21 of Wiegand [line 6 to two lines past equation 6] of Wiegand)**; and

stopping means for adjusting an early-stopping threshold in response to checked macroblock modes, and selecting the mode for the current macroblock in response to the checked macroblock modes if the adjusted early-stopping threshold is met **(Sections B and C on pages 184-185 of Wiegand** – *limiting [stopping] condition adjusted, and the mode switching optimized, based on the determined Lagrange multiplier*),

wherein the encoder further comprises means for encoding the current macroblock using the selected mode for the current macroblock **(page 183, left column, lines 3-6 of Wiegand)**.

Further regarding claim 1: The encoder of claim 13 performs the method of claim 1.

Further regarding claim 25: The method of claim 1 is implemented *via* a computer-readable non-transitory medium **(page 185, first paragraph under Section A in Wiegand)**.

Regarding claims 2, 14 and 26: Wiegand discloses first-checking means for checking first modes for a subset of macroblock modes, selectively checking other modes in response to motion vector information of the checked first modes, and selecting the mode for the current macroblock in response to the checked modes **(page 184, left column, lines 6-34 of Wiegand [line 6 to fifteen lines past equation 6]** – *macroblock modes used in the selection are limited based on distortion and motion vector information*).

Regarding claims 4, 16 and 28: Wiegand discloses neighbor-checking means for checking the macroblock mode of at least one neighboring macroblock, and selecting the mode for the current macroblock in response to the macroblock mode of the at least one checked neighboring macroblock **(page 184, left column, lines 6-34 of Wiegand [line 6 to fifteen lines past equation 6]** – *macroblock modes used in the selection are limited not only based on the current mode, but also on the modes of adjacent macroblocks*).

Regarding claims 5, 17 and 29: Wiegand discloses comprising intra-checking means for checking the cost of a subset of macroblock modes, further checking only intra-coded modes if the checked cost meets a preset criteria, and selecting the mode for the current macroblock in response to the checked modes **(page 183, right column, lines 2-7; and page 184, left column, lines 6-21 of Wiegand [line 6 to two lines past equation 6] of Wiegand)**.

Regarding claims 6, 18 and 30: Wiegand discloses comprising thresholding means for adjusting an early-stopping threshold in response to checked macroblock modes, and selecting the mode for the current macroblock in response to the checked macroblock modes if the adjusted early-stopping threshold is met **(Sections B and C on pages 184-185 of Wiegand** – *limiting [stopping] condition adjusted, and the mode switching optimized, based on the determined Lagrange multiplier***)**.

Regarding claims 9, 21 and 33: Wiegand discloses wherein spatial/temporal neighboring macroblock and block partition information is used to decide the subset of possible block sizes or inter/intra modes that need to be checked **(page 183, left column, line 57 to right column, line 5; and page 184, left column, lines 6-34 of Wiegand [line 6 to fifteen lines past equation 6]** – *intra/inter frame encoding and macroblock modes used are based on the current mode and on the modes of adjacent macroblocks***)**.

Regarding claims 10, 22 and 34: Wiegand discloses inter/intra checking means for initially performing mode checking for a subset of both inter modes and intra modes **(page 183, left column, line 55 to page 184, left column, line 21 of Wiegand** – *macroblock modes initially limited based on computed criteria, as further shown in figure 1***)**;

complexity means for calculating a complexity measure responsive to the mode checking **(pages 184-185, Sections B["Lagrange Multiplier Determination"] & C["Parameter Optimization"] of Wiegand)**; and

inter/intra determination means for using the complexity measure to determine if other inter modes and intra modes should be performed **(page 185, right column, line 4 to page 185, right column, end of Section C of Wiegand** – *optimized cost function used to determine which modes should be checked and/or utilized*).

Regarding claims 11, 23 and 35: Wiegand discloses wherein the early stop criteria are based on adaptive thresholding to stop checking other inter or intra modes **(page 185, right column, line 4 to page 185, right column, end of Section C of Wiegand** – *cost parameters are optimized [adaptive thresholding] to determine where to narrowly search for modes, and thus where to stop checking modes*).

Regarding claims 12, 24 and 36: Wiegand discloses wherein early termination takes place if spatially or/and temporally neighboring macroblocks have a specific relationship with the motion information of the current macroblock after examining a specific mode **(page 184, left column, lines 6-34; and page 185, right column, line 4 to page 185, right column, end of Section C of Wiegand** – *modes searched limited based on cost parameters, which include neighboring macroblocks*).

Regarding claim 37: Wiegand discloses, in a video encoder having a processor **(page 182, left column, lines 1-2 after "Introduction" of Wiegand)**, a video encoding method for encoding a macroblock of an inter-coded frame **(page 182, right column, lines 13-15 of Wiegand)**, the method comprising:

selecting a subset of macroblock modes for encoding (**page 184, left column, lines 6-34 of Wiegand [line 6 to fifteen lines past equation 6]** – *macroblock modes used in the selection are limited based on distortion and motion vector information*);

comparing said subset of macroblock modes for coding efficiency (**page 184, left column, line 35 to right column, end of Section A of Wiegand** – *macroblock modes which do not follow along optimal path are considered to be less efficient*);

selecting a mode having favorable coding efficiency, responsive to said step of comparing modes (**page 185, right column, line 4 to page 185, right column, end of Section C of Wiegand** – *optimized cost function used to determine which modes should be used*); and

encoding the macroblock using the selected mode (**page 183, left column, lines 3-6 of Wiegand**).

9. Claims 3, 15 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wiegand ("Rate Distortion Optimized Mode Selection for Very Low Bit Rate Video Coding and the Emerging H.263 Standard," by Thomas Wiegand, Michael Lightstone, Debargha Mukherjee, T. George Campbell, and Sanjit K. Mitra, IEEE Transactions on Circuits and Systems for Video Technology, April 1996, pages 182-190) in view of Wang (US-2003/0099292).

Regarding claims 3, 15 and 27: Wiegand does not disclose expressly wherein said first modes comprise the quadratic modes of SKIP, 16x16, 8x8, and 4x4.

Wang discloses wherein said first modes comprise the quadratic modes of SKIP (para. 97 of Wang), 16x16, 8x8, and 4x4 (figs. 3a-3f and para. 57-58 of Wang).

Wiegand and Wang are combinable because they are from the same field of endeavor, namely digital video data encoding. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the quadratic modes of SKIP, 16x16, 8x8, and 4x4, as taught by Wang. The suggestion for doing so would have been that the modes are commonly used modes for macroblock encoding. Therefore, it would have been obvious to combine Wang with Wiegand to obtain the invention as specified in claims 3, 15 and 27.

10. Claims 7, 8, 19, 20, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wiegand ("Rate Distortion Optimized Mode Selection for Very Low Bit Rate Video Coding and the Emerging H.263 Standard," by Thomas Wiegand, Michael Lightstone, Debargha Mukherjee, T. George Campbell, and Sanjit K. Mitra, IEEE Transactions on Circuits and Systems for Video Technology, April 1996, pages 182-190) in view of Kim (US-5,926,573).

Regarding claims 7, 19 and 31: Wiegand does not disclose expressly initially performing motion estimation only for a subset of the possible block sizes; and using the motion information to determine if other motion estimation or complexity measures should be performed for other block sizes.

Kim discloses initially performing motion estimation (**column 4, lines 63-67 of Kim**) only for a subset of the possible block sizes; and using the motion information to determine if other motion estimation or complexity measures should be performed for other block sizes (**fig. 2 and column 3, lines 37-46 of Kim** – *The original macroblock modes are checked first to determine if the mode is appropriate for recoding. If not, then and only then are additional*

macroblock modes checked. Intra versus inter coding uses different sizes, as do the different inter-coding macroblock modes.).

Wiegand and Kim are analogous art because they are from the same field of endeavor, namely digital video data encoding. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to initially perform motion estimation only for a subset of the possible block sizes, and use the motion information to determine if other motion estimation or complexity measures should be performed for other block sizes, as taught by Kim. The motivation for doing so would have been to improve the overall encoding efficiency. Therefore, it would have been obvious to combine Kim with Wiegand to obtain the invention as specified in claims 7, 19 and 31.

Regarding claims 8, 20 and 32: Wiegand does not disclose expressly wherein said first modes are checked first and their motion information is used to decide if other modes needs to be checked.

Kim discloses wherein said first modes are checked first and their motion information is used to decide if other modes needs to be checked **(fig. 2 and column 3, lines 37-46 of Kim)**.

Wiegand and Kim are analogous art because they are from the same field of endeavor, namely digital video data encoding. At the time of the invention, it would have been obvious to check said first modes first and use their motion information to decide if other modes need to be checked, as taught by Kim. The motivation for doing so would have been to improve the overall encoding efficiency. Therefore, it would have been obvious to combine Kim with Wiegand to obtain the invention as specified in claims 8, 20 and 32.

Conclusion

11. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is (571)272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 571-272-7653. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James A Thompson/
Primary Examiner, Art Unit 2625

28 October 2011